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CONTEMPORARY TECHNIQUE USED OF EVIL-PLASTIC IN MAINTENANCE OF CIVIL ENGINEERING STRUCTURES

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ABSTRACT

The present paper deals with modern technique applied for maintenance of civil engineering structures to prevent seepages and leakages. The presented methodology is quite economical. Besides fulfillment of the proposed objective, the method involves added advantage of getting rid of evil non biodegradable plastic waste from the environment. After application of presented method, improves not only the quality of repair of joints and cracks but also the projected life of building. One of the major provisions under the new Rules is the explicit recognition of the role of waste pickers from the waste disposal sites and streets. Their role is recognized with the proposed coined term "Environmental Angels". We would also like to contribute our future generation to save our environment from the "Evil-Plastic Waste" widely used in day to day life.

KEYWORDS: Environmental Angels (EA), Evil-Plastic Waste (EPW), Seepage Resistant Material (SRM)

INTRODUCTION

Over the last three decades, there has been an increasing global concern over the public health impacts attributed to environmental pollution, in particular, the global burden of disease. The World Health Organization (WHO) estimates that about a quarter of the diseases facing living beings including flora and fauna are occurred due to prolonged exposure to environmental pollution. Most of these environment-related diseases are however not easily detected and may be acquired during childhood that gets manifested as disorder of alarming level at later adult stage (www.who.int). Inappropriate management of solid waste is one of the major causes of environmental pollution and degradation in many cities, especially in developing countries (Pandey, 2012). Many of these cities lack solid waste regulations and proper disposal amenities including for unsafe waste for healthy life. Such waste may be communicable, poisonous or radioactive.

Municipal waste discarding sites are chosen places set to the side for waste disposal. Depending on a city's level of waste management, such waste may be discarded in an uncontrolled manner, segregated for recycling purposes, or simply burnt. Poor waste management poses a great challenge to the well-being of city residents, particularly those living adjacent the dumpsites due to the potential of the waste to pollute water, food sources, land, air and vegetation. The poor disposal and handling of waste thus leads to environmental degradation, demolition of the ecosystem and poses great risks to public health (www.unep.org).

Urbanization has brought forth several maladies and suffering to human kind, besides bringing economic and cultural development in its fold. Due to pressure of urbanization most of the cities are growing fast and sometimes they develop beyond the planned limits. Due to increasing urbanization, industrialization and population, large amount of

wastes are being generated in different forms such as solid, liquid, sludge, gases and plastic. Each city produces tones of solid wastes daily from households, hospitals, industry, offices, market etc. Some of these are biodegradable some are non biodegradable and hazardous waste. Out of which most of it still remain there, which later pile up and chock cities drainage lines (Pandey, 2012). The best example of this is 2005 floods occurred in Mumbai in India. Municipal solid waste, usually known as rubbish or garbage, is made up of things we commonly dispose of by throwing away. Plastics constitute approximately 11.8% (www.cpcb.nic.in) of the weight of municipal solid waste. This household type of waste ranges from our package wrappings, food and scraps and it contains most of the plastic and its products.

Government of India has undertaken several steps to overcome with this problem which included Bio-Medical Waste (Management & Handling) Rules, 1998 and Plastic Waste (Management & Handling) Rules, 2011. Some of the salient features of these rules are "foodstuffs will not be allowed to be packed in recycled plastics or compostable plastics", and many more. Use of plastic materials in sachets for storing, packing or selling 'Gutkha', tobacco and usage of polythene pouch has been banned.

One of the major provisions under the new Rules is the explicit recognition of the role of waste pickers from the waste disposal sites and streets. Their role is recognized with the proposed coined term "Environmental Angels". Who contribute to our future generation to save our environment from the "Evil-Plastic Waste" widely used in day to day life?

Plastic has different physical and chemical properties. Some physical properties are transparency, flexibility, elasticity, impervious, water resistant, electrical resistance, Specific Gravity, low heat resistance, chemical resistance. Plastic material offers varied composition and qualities; they come in so many colors and forms, it shouldn't surprise us that the creative individual should see plastic as an exciting opportunity.

Plastic materials have revolutionized the consumption of durable goods and virtually all major manufacturing industries in the world (Elias, 2003). From 1960 to 2000, the volume of production and consumption of plastics in the world has increased in many folds (Flores, 2008). The impact of plastics is derived from their numerous desirable properties for materials used in products ranging from milk jugs to water pipes to microprocessor packages along with the many benefits that modern society has obtained from plastic production and consumption.The high degree of household refuse and industrial disposal of plastic materials causes a significant level of environmental concern. Under this back ground in the present work, the use of waste plastic as an alternative material is attempted in construction, repairing & servicing of civil engineering structures particularly to block seepage as seepage resistant material.

Plastics are used throughout the world for a broad number of reasons. Over 23 MT of the world's yearly trash load is plastic. Plastics are so durable that they do not rot or decay as do the natural products such as wood and other materials (Andrady, 2003),. As a result great amounts of discarded plastic products accumulate in the environment as waste. They do not burn easily; instead, they melt and simply accumulate at the bottom of the incinerator. Although plastic is certainly a globally important product which comes mostly with our daily needs product and for packaging purpose. Plastic is a pervasive feature of our everyday life; whether we love it or loathe it. (www.plasticindustries.com).

While there are still many questions left unanswered when it comes to the environment and plastic, it is clear plastic is here to stay for a very long time. The Central Government too, has made assessment of the extent of damage caused to environment by plastic waste in the country by constituting Committees and a Task Force which studied the issue and made recommendations (www.karmayog.org).The Ministry of Environment and Forests issued the Recycled Plastics Manufacture and Usage Rules 1999, and amended it in 2003 under the Environment (Protection) Act, 1986 for regulating and managing plastic carry bags and containers.

Cracks may be Classified as

Structural Cracks

- Due to incorrect design
- Faulty construction
- Overloading
- Expansion Joints

Non Structural Cracks

- Moisture changes
- Thermal movement
- Elastic deformation
- Creep
- Chemical reaction
- Foundation movement and settlement of soil
- Vegetation

METHODOLOGY

The methodology of this study depends on the nature of the seepages. First step involves identification of area that is prone to leakage for severity of the defects.

Later on the surface is cleaned to make it dust free.

Rock oil (Kerosene) or highly inflammable fuel is injected into the defected surface by using syringe or by injecting method which is later burnt to evaporate moisture contents present in the cracks as shown in Figure 1

APPARATUS

Fire Gun, Syringe, Rock Oil, Evil Waste Plastic (EPW), Lime Powder or Fine Grained Sand.

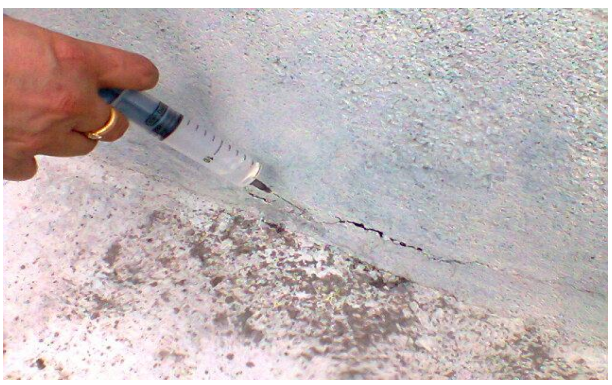

Figure 1: Showing Injecting of Highly Inflammable Fuel in to Crakes

Now again clean the crack. After that, lying of EPW should be done in proper manner so that EPW covers the crack as shown in Figure 2.

Figure 2: Showing Covers of Plastics on Crakes

Now, using syringe inject little amount of Rock oil (Kerosene) or highly inflammable fuel into the fractured surface and sprayed over the EPW for continuous burning as shown in Figure 3

Figure 3: Showing Burring of Plastic

Burning of waste plastic should be done up to the level so as to allow liquid plastic (melted) to easily enter into the cracks as shown in Figure 4.

Figure 4: Showing Liquidation of Plastic (Melted)

After some time when it seems that crack has been adequately filled with melted plastic, burning process should be stopped by spreading lime or fine grained sand as shown in Figure 5.

Figure 5: Showing Spreading of Lime or Fine Grained Sand

RESULTS & DISCUSSIONS

Our main objective is to repair these leaks or cracks using waste plastic. Once wall/ roof or extension joint gets cracked it can be difficult to prevent recurrent cracking at the same location.

CASE STUDY

Site.1 located at Workshop, Manoharbhai Patel Institute of Engineering. The comparison of seepages status on 2nd Sept.2011 onwards is shown in the Table.1 before and after treatment with modern injection techniques applied.

Table 1: Showing Comparison of Seepages before and after Treatment with Modern Injection Techniques Applied

Types of Crack & Dimension	Seepage		Inspection Dates.
	before Treatment	after Treatment	
Extensions Joint Length 450mm Width 0.5 to 1mm Depth 112.5 mm	50ml Water/ Hrs,	Dampness. Dampness. Dry Dry Dry Dry Dry Dry	02-09-2011 01-10-2011. 01-11-2011. 01-12-2011. 01-07-2012. 01-09-2012. 18-07-2013. 22-08-2013. 30-09-2013

Site 2 located at Manoharbhai Patel Institute of Engineering entrance of Electronics & Communication class rooms building. The comparison of seepages status on 2nd Sept.2011 is shown in the Table 2 before and after treatment with modern injection techniques applied.

Table 2: Showing Comparison of Seepages before and after Treatment with Modern Injection Techniques Applied

Types of Crack & Dimension	Seepage		Inspection Dates.
	before Treatment	after Treatment	
Extensions Joint Length 250mm Width 1to2 mm Depth 65 mm	78ml Water/ Hrs,	Dampness Dry Dry Dry Dry Dry Dry Dry	02-09-2011 01-10-2011. 01-11-2011. 01-12-2011. 01-07-2012. 01-09-2012. 18-07-2013. 22-08-2013. 30-09-2013

Figure 6: Showing Collected Water through Fractured Surface

CONCLUSIONS

It is noticed since past two rainy seasons, the result is quite satisfactory since, there was no leakage in the treated area while compared with some structures in the same building treated with conventional methods. The present methodology application of Evil-Plastic Waste (EPW) as Seepage Resistant Material (SRM) is quite economical. Besides fulfillment of the proposed objective, the method involves added advantages the getting rid of evil non biodegradable plastic from the environment. This proves not only the quality of the joints is improved but also the building is long lasting. Therefore it is benefit to the owner of the house and also to nation on the whole. The present method of leakage treatment needs to be implemented by government as well as private building owners. The present method sustain long for leak proof of joints and crakes. Such awareness may be made through the effort of Government and public participation as well.

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